Amendments to the Drawings

Please replace drawing sheet 2 of 3 with the attached Replacement Sheet, which is a corrected drawing sheet comprising the amended Figure 2 in compliance with 37 CFR 1.121(d). A marked-up copy showing the amendments to Figure 2 is also submitted herewith, and labeled as "Annotated Sheet".

Figure 2 has been amended in accordance with the Examiner's instructions, in order to more clearly show a small volume device. While the small volume device in the example shown in Figure 2 is a microfluidics substrate, the specification clearly states that a small volume devices may also be an array chip, an array plate, or an array slide (e.g., Application at p. 3, lines 29-32).

Remarks

Reconsideration of this Application is respectfully requested. Claims 1-8, 14-16, 18, 19 and 32-35 are pending in the application, with claims 1 and 32 being the independent claims. No claims have been amended with this response.

The drawings have been amended as suggested by the Examiner, and the corresponding text in the specification has been amended to reflect the amended drawings. No new matter is added by way of these amendments, and their entry is respectfully requested.

Based on the above amendments and the following remarks, Applicants respectfully request that the Examiner reconsider and withdraw the outstanding rejections.

Objections to the Drawings

The Examiner objected to the drawings under 37 CFR 1.83(a), and stated that the small volume device must be shown in the figures. Applicants disagree with this objection, and point out that the microfluidics substrate of Figure 2 is just one example of a small volume device. However, in order to be fully responsive, Applicants have amended Figure 2 to specifically shown that the substrate is a small volume device.

The specification has also been amended accordingly to clarify that the small volume device shown in FIG. 2 may be, for example, an array chip, an array plate, or an array slide. Support for these amendment may be found throughout the specification, for example on p. 3 at lines 29-32. No new matter is added by these amendments.

Rejections under 35 U.S.C. § 103(a)

Tateiwa (US 5,444,529)

Claims 1, 4-6 and 14-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tateiwa (US 5,444,529). The Office Action states that, while Tateiwa lacks specific reference to an array chip, array plate or an array slide, "it is very well known in the art to use an array chip, array plate or array slide for the purpose of inspecting the devices [i.e. the fluid contained in the devices] for unwanted particles or viewing multiple samples." (Office Action at page 3)

Applicants respectfully traverse this rejection. The present claims recite methods for using light-scattering particles to determine a dynamic property of a fluid volume, and for analyzing fluid flow, in array chips, array chips or array slides. In stark contrast, Tateiwa discloses a method for using water drops to detect the presence of particles, e.g., dust particles, on a semiconductor device. (See, e.g., Tateiwa at column 1, lines 8 - 18). In particular, Tateiwa discloses surrounding otherwise undetectable dust particles with condensed water and detecting diffuse light patterns scattered by the water (Tateiwa at column 1, lines 44-47).

It is unclear to Applicants what the Examiner means by the statement that "it is very well known in the art to use and array chip, array plate or array slide for the purpose of inspecting the devices...". The present claims are directed to determining dynamic properties of fluids in small volume devices, not inspecting devices. Thus, there is no suggestion or motivation in the prior art, or even in the general knowledge of one skilled in the art to substitute an array chip, array plate or array slide for the semiconductor device of Tateiwa, as is apparently suggested by the Examiner.

Nevertheless, even assuming that one might somehow be motivated to substitute an array chip, array plate or array slide for the semiconductor device of Tateiwa, the proposed combination would still not teach or suggest each and every element of the claimed invention. In particular, Tateiwa does not teach or suggest detecting scattered light from light scattering particles as in Applicants' independent claim 1. In fact, in Tateiwa, diffuse light patters are scattered by liquid water surrounding a dust particle and detected as an indicator of the presence of the dust particle. The particles themselves do not scatter a detectable amount of light. (e.g., see Tateiwa at. col. 1, lines 38-47)

Therefore, for at least the reasons stated above, independent claim 1 is patentable over Tateiwa. Claims 4-6 and 14-16 ultimately depend from claim 1, and are therefore patentable over Tateiwa for at least the same reasons as claim 1.

Although not necessary in light of the arguments above, Applicants further respectfully contend that the Examiner's specific rejection of claims 4-6 and 14-16 are without basis. For example, regarding claims 4 and 5, the Examiner states that "Tateiwa teaches probes are present in the fluid volume and the particle distribution is indicative of the distribution of the probes in the fluid volume (col. 2 lines 11-27)." (Office Action at p. 4) Applicants disagree, and point out that the section of Tateiwa cited by the Examiner makes no mention of a probe of any kind. The

section cites only a silicon substrate (item 1 of FIGS. 1-3), a particle attached to the silicon substrate (item 2), and a water drop surrounding the particle (3). The silicon substrate (1) is clearly not a probe, as it is the substrate to which the particle (3) is attached. The water drop is not a "probe in the fluid volume", the water drop is the fluid volume. Finally, the particle (3) is not a probe - otherwise the Examiner's above-captioned statement would be circular and nonsensical (i.e. "...the particle distribution is indicative of the distribution of *the particle* in the fluid volume).

With regard to claim 6, the Examiner contends that "Tateiwa teaches the dynamic property is uniformity of drying on a solid surface" and again cited column 2, lines 11-27 of Tateiwa (Office Action at p. 4). Applicants respectfully contend that the cited section of Tateiwa, as with the rest of Tateiwa, includes no mention, teaching or suggestion of a uniformity of drying as a property that is determined. Tateiwa teaches only condensation of water around a particle in order to detect the particle using a laser.

With regard to claims 14-16, the Examiner states that "Tateiwa teaches a plurality of features and has deposited on each feature a volume of 10pL to 2 microliters (3)". Applicants respectfully disagree, and contend that Tateiwa teaches only a silicon substrate and, as discussed above, includes no teaching or suggestion of using a substrate comprising a plurality of features, e.g., an array chip, plate or slide.

For the foregoing reasons, Applicants respectfully request that the rejection of claims 1, 4-6 and 14-16 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Tateiwa in view of Webb (US 4,385,830)

Claims 2, 3, 7, 8, 18, 32 and 33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tateiwa in view of Webb (US 4,385,830). The Examiner contends that Tateiwa teaches the invention as claimed but lacks reference to: flow rate (regarding claims 2 and 32), measuring particle distribution (regarding claim 3), measuring flow pattern (regarding claim 7), measuring fluid mixing (regarding claim 8), and one particle comprising a plurality of distinguishable particles (regarding claims 18 and 33).

Claims 2, 3, 7, 8, 18 depend from claim 1, and therefore are patentable over the proposed combination of Tateiwa and Webb for at least the reasons specified above with respect to claim

1. In particular, the proposed combination does not teach or suggest any method for determination of a dynamic property of a fluid volume comprising detecting light scattered from at least one light scattering particle in the fluid volume. Webb discloses an optical system for measurement of vorticity in a fluid using transparent particles having embedded planar crystal mirrors for measuring particle rotation rate.

With regard to claims 32 and 33, the proposed combination also does not teach or suggest illuminating a suspension of light scattering particles and detecting light scattering particles as an indication of fluid flow.

Moreover, Applicants respectfully contend that nothing in either reference would motivate one skilled in the art to combine the references as suggested by the Examiner. The two references are from completely different fields: Tateiwa deals solely with detecting the presence of dust particles on the surface of a semiconductor substrate; and Webb deals with measurements of vorticity of a fluid using an optical probe. Because Tateiwa has nothing to do with dynamic measurements of fluids, such as flow rate, flow pattern and fluid mixing, for example, one would find no motivation or suggestion to modify Tateiwa to perform such functions, let alone to search for, find and incorporate the teachings of Webb as suggested by the Examiner.

Accordingly, Applicants respectfully request that the rejection of claims 2, 3, 7, 8, 18, 32 and 33 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Tateiwa in view of Webb and further in view of Dittrich (US 3,738,759)

Claim 19 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Tateiwa in view of Webb and further in view of Dittrich (US 3,738,759). Claim 19 depends from claim 1 and therefore distinguishes over the proposed combination for at least the same reasons as claim 1. In particular the proposed combination does not teach or suggest any method for determination of a dynamic property of a fluid volume comprising detecting light scattered from at least one light scattering particle in the fluid volume. Adding the teachings of Dittrich to intersect two fluid streams does not cure the above-described deficiencies of Tateiwa and Webb.

Accordingly, Applicants respectfully request that the rejection of claim 19 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Tateiwa in view of Webb and further in view of McDowell (US 5,905,568)

Claims 34 and 35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tateiwa in view of Webb and further in view of McDowell (US 5,905,568). Claims 34 and 35 depend from claim 32, and are patentable over the proposed combination for at least the same reasons as discussed above with respect to claim 32. Moreover, Applicants respectfully contend that nothing in any of the references would motivate one to modify Tateiwa and combine the references as suggested by the Examiner. In particular, as discussed above, Tateiwa teaches only the use of condensed, stationary water droplets to detect the presence of dust particles on a semiconductor surface. The teachings of Tateiwa have no relation to measurements or analysis of fluid or fluid flows, and there is no teaching or suggestion in any of the cited references, or in the general knowledge of one skilled in the art, to motive one to modify Tateiwa to perform such measurements.

Accordingly, Applicants respectfully request that the rejection of claims 34 and 35 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Conclusion

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. Applicants believe that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

It is not believed that any fees are required beyond those that may otherwise be provided for in documents accompanying this paper. However, if additional fees are due to prevent abandonment of this application, then any fees required are hereby authorized to be charged to Jones Day Deposit Account No. 50-3013.

Respectfully submitted,

Date: October 19, 2005

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"ANNOTATED SHEET"

Figure 2
Wide Angle Detection